

BEST AVAILABLE COPY

RECEIVED  
CENTRAL FAX CENTER  
JUN 21 2005Cuno Incorporated  
400 Research Parkway  
Meriden, CT 06450  
Phone 203-238-8737  
Fax 203-238-8716

Fax Cover Letter

To: Examiner Kimberly Keeler, GAU 1723  
Fax No: (703) 872-9306  
From: R. Thomas Payne  
Date: June 20, 2005

Total number of pages including cover letter: 10

If you do not receive all of the pages, please call us at 203-238-8851

Re: U.S. Patent Application No. 10/669,533  
Multi-Layer Pleat Support Filter Construction  
Filed: September 24, 2003; Jeffrey LUCAS et al.  
Our Ref: CUNO-639.1

**SUPPLEMENTAL RESPONSE TO OFFICE ACTION**

Dear Examiner Keeler:

Kindly enter the attached International Preliminary Examination Report (IPER) issued by the European Patent Office in the corresponding European application, in the above-captioned application. The IPER is referred to as being attached in the Response to Office Action filed on June 1, 2005; however, due to an unintentional misunderstanding, the IPER was not attached to the original Response.

No fee is believed due for filing this Response. However, if it is determined that a fee is required, authorization is hereby given to charge deposit account no. 033879.

Respectfully submitted,

  
R. Thomas Payne  
Attorney for Applicants**Certificate of Facsimile Transmission**

I hereby certify that this correspondence is being facsimile transmitted to 703-872-9306: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on the date indicated below.

Date: 6-21-05  
May Rudolph**Confidentiality Notice**

This email and the documents accompanying this email is intended solely for the recipient(s) to which it is addressed, and contains information that may be confidential or privileged and exempt from disclosure under applicable law. If you are not the intended recipient, be aware that any disclosure, copying, distribution or use of the contents of this email is not authorized and is prohibited. If you have received this email in error, please notify us immediately, and delete each and every copy of it.

## PATENT COOPERATION TREATY

RECEIVED  
10-19-04From the  
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

PCT

To:

PAYNE, Thomas R.  
CUNO Incorporated  
400 Research Parkway  
P.O. Box 1018  
Meriden, CT 06450-1018  
ETATS-UNIS D'AMERIQUE

NOTIFICATION OF TRANSMITTAL OF  
THE INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT  
(PCT Rule 71.1)

Date of mailing  
(day/month/year)

14.10.2004

Applicant's or agent's file reference

xxx

CUNO-639.1 PCT

## IMPORTANT NOTIFICATION

International application No.

PCT/US 03/29987

International filing date (day/month/year)

24.09.2003

Priority date (day/month/year)

26.09.2002

Applicant

CUNO INCORPORATED

1. The applicant is hereby notified that this International Preliminary Examining Authority transmits herewith the international preliminary examination report and its annexes, if any, established on the international application.
2. A copy of the report and its annexes, if any, is being transmitted to the International Bureau for communication to all the elected Offices.
3. Where required by any of the elected Offices, the International Bureau will prepare an English translation of the report (but not of any annexes) and will transmit such translation to those Offices.
4. **REMINDER**

The applicant must enter the national phase before each elected Office by performing certain acts (filing translations and paying national fees) within 30 months from the priority date (or later in some Offices) (Article 39(1)) (see also the reminder sent by the International Bureau with Form PCT/IB301).

Where a translation of the international application must be furnished to an elected Office, that translation must contain a translation of any annexes to the international preliminary examination report. It is the applicant's responsibility to prepare and furnish such translation directly to each elected Office concerned.

For further details on the applicable time limits and requirements of the elected Offices, see Volume II of the PCT Applicant's Guide.

The applicant's attention is drawn to Article 33(5), which provides that the criteria of novelty, inventive step and industrial applicability described in Article 33(2) to (4) merely serve the purposes of international preliminary examination and that "any Contracting State may apply additional or different criteria for the purposes of deciding whether, in that State, the claimed inventions is patentable or not" (see also Article 27(5)). Such additional criteria may relate, for example, to exemptions from patentability, requirements for enabling disclosure, clarity and support for the claims.

Name and mailing address of the international  
preliminary examining authority:



European Patent Office  
D-80298 Munich  
Tel. +49 89 2399 - 0 Tx: 523656 apmu d  
Fax: +49 89 2399 - 4465

Authorized Officer

Fuerbass, C



Tel. +49 89 2399-8132



## PATENT COOPERATION TREATY

## PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT  
(PCT Article 36 and Rule 70)

Applicant's or agent's file reference xxx	<b>FOR FURTHER ACTION</b> See Notification of Transmittal of International Preliminary Examination Report (Form PCT/PEA416)	
International application No. PCT/US 03/29987	International filing date (day/month/year) 24.09.2003	Priority date (day/month/year) 26.09.2002
International Patent Classification (IPC) or both national classification and IPC B01D29/21		
Applicant CUNO INCORPORATED		
<p>1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 4 sheets, including this cover sheet.</p> <p><input checked="" type="checkbox"/> This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 807 of the Administrative Instructions under the PCT).</p> <p>These annexes consist of a total of 4 sheets.</p>		
<p>3. This report contains indications relating to the following items:</p> <p>I <input checked="" type="checkbox"/> Basis of the opinion</p> <p>II <input type="checkbox"/> Priority</p> <p>III <input type="checkbox"/> Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</p> <p>IV <input type="checkbox"/> Lack of unity of invention</p> <p>V <input checked="" type="checkbox"/> Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</p> <p>VI <input type="checkbox"/> Certain documents cited</p> <p>VII <input type="checkbox"/> Certain defects in the international application</p> <p>VIII <input type="checkbox"/> Certain observations on the international application</p>		
Date of submission of the demand  19.04.2004	Date of completion of this report  14.10.2004	
Name and mailing address of the International preliminary examining authority:   European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized Officer  Hoffmann, A  Telephone No. +49 89 2399-8610 	

**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT**International application No. **PCT/US 03/29987****I. Basis of the report**

1. With regard to the elements of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

**Description, Pages**

1-19 as originally filed

**Claims, Numbers**

1-13 received on 04.10.2004 with letter of 01.10.2004

**Drawings, Sheets**

1/2-2/2 as originally filed

2. With regard to the language, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:
- ☐ the drawings, sheets:

**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT**International application No. **PCT/US 03/29987**

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)).

*(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)*

6. Additional observations, if necessary:

**V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

**1. Statement**

Novelty (N)	Yes: Claims	1-13
	No: Claims	
Inventive step (IS)	Yes: Claims	1-13
	No: Claims	
Industrial applicability (IA)	Yes: Claims	1-13
	No: Claims	

**2. Citations and explanations**

**see separate sheet**

**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/US 03/29987

The following documents are cited in the Int. Search Report:

- D1: EP-A-0 470 485 (PALL CORP) 12 February 1992 (1992-02-12)
- D2: US-A-5 374 354 (VANDERZYPEN HENRY R ET AL) 20 December 1994 (1994-12-20)
- D3: EP-A-0 048 310 (INCOM INT INC) 31 March 1982 (1982-03-31)
- D4: US-A-4 012 211 (GOETZ GEORGE W) 15 March 1977 (1977-03-15)
- D5: US-B-6 267 2521 (AMSLER NICOLE MICHELE) 31 July 2001 (2001-07-31)
- D6: US-A-4 488 986 (SCHAEFFER JOHN I) 18 December 1984 (1984-12-18)
- D7: US 2002/060183 A1 (PAUL C THOMAS ET AL) 23 May 2002 (2002-05-23)
- D8: US-A-3 871 851 (NEUMANN GERHARD MAX) 18 March 1975 (1975-03-18)
- D9: US-A-4 033 881 (PALL DAVID B) 5 July 1977 (1977-07-05)

**POINT V:**

The closest prior art is D1 which discloses an extruded mesh material for the downstream support layer 24 having ribs (see figure 3 and accompanying description).

The subject matter of claim 1 is new over D1 by providing an extruded apertured film material having ribs.

As demonstrated by the Applicant with comparative experiments in his letter of 01.10.2004 an extruded apertured film material having ribs gives a surprising greater ability to "nest" when folded than the extruded mesh material of D1. The advantage of the use of an extruded apertured film material having ribs in comparison with the use of an extruded mesh material having ribs as disclosed in D1 is a higher number of pleats and thus a greater filtering surface for a cartridge of the same dimension.

Thus the subject matter of claim 1 and the dependent claims thereof fulfill the requirements of Articles 33(2) and 33 (3) PCT.

The description is not adapted to the new claims and D1 is not discussed therein.

WHAT IS CLAIMED

1. A filter element<sup>(12)</sup> comprising:
  - a filtration media<sup>(18)</sup>;
  - an upstream filtration media support<sup>(16)</sup> positioned upstream from and in contact with said filtration media; and
  - a multi-layer downstream filtration media support<sup>(13,22)</sup> positioned downstream from said filtration media, said multi-layer downstream support including a first downstream support layer<sup>(15)</sup> and a second downstream support layer<sup>(22)</sup>, wherein:
    - (a) said first downstream support layer<sup>(19)</sup> is in contact with said filtration media<sup>(18)</sup> and is interposed between said filtration media and said second downstream layer<sup>(22)</sup>, said first downstream support layer is fabricated so as to minimize points of surface contact with said filtration media; and
    - (b) said second downstream support layer<sup>(22)</sup> is in contact with said first downstream support layer and is fabricated so as to facilitate lateral fluid flow relative to said multi-layer downstream pleat support, wherein said second downstream support layer<sup>(22)</sup> comprises an extruded apertured element<sup>(14)</sup> having ribs.
2. A filter element as recited in Claim 1, wherein the filtration media<sup>(18)</sup> is a pleated filtration media having a plurality of longitudinally extending pleats<sup>(14)</sup>.
3. A filter element as recited in Claim 2, wherein the longitudinally extending pleats<sup>(14)</sup> of said pleated filtration media<sup>(18)</sup> are selected from the group consisting of radial pleats, w-pleats and spiral pleats.
4. A filter element as recited in Claim 1, wherein the filtration media<sup>(18)</sup> is a microporous filtration membrane having a pore size of from about 0.1 microns to about 10 microns.
5. A filter element as recited in Claim 1, wherein the filtration media<sup>(18)</sup> is fabricated from a material selected from the group consisting of Teflon, nylon, polyaramide, polyvinylidene difluoride, polyether sulfone and combinations thereof.

04-15-2004

6. A filter element as recited in Claim 1, wherein the multi-layer downstream support consists of said first downstream support layer and said second downstream support layer.

7. A filter element as recited in Claim 1, wherein said first downstream support layer is fabricated from a nonwoven material.

8. A filter element as recited in Claim 7, wherein said nonwoven material is laminated to said filtration media.

9. A filter element as recited in Claim 7, wherein said nonwoven material is fabricated as a spunbond, spunlace, airlaid or wetlaid material.

10. A filter element as recited in Claim 7, wherein said nonwoven material is fabricated from polypropylene, polyester or polyamide.

11. A filter as recited in Claim 1, wherein said extruded apertured element has ribs on one side.

12. A filter element, comprising:  
a filtration media;  
an upstream pleat support positioned upstream from and in contact with said filtration media; and  
a multi-layer downstream pleat support positioned downstream from said filtration media, said multi-layer downstream support including a first downstream support layer and a second downstream support layer, wherein:

- (a) said first downstream support layer is in contact with said filtration media and is interposed between said filtration media and said second downstream layer, said first downstream support layer is fabricated so as to minimize points of surface contact with said filtration media; and
- (b) said second downstream support layer is in contact with said first downstream support layer and is fabricated so as to facilitate lateral fluid flow relative to

said multi-layer downstream pleat support, wherein said second downstream support layer comprises an extruded apertured element having ribs.

12. ~~431~~ A filter cartridge comprising:

*According to any one of claims 1 to 11, the filter element (12)*  
a filter element having a longitudinal axis, an outer periphery and an inner periphery; *and*

~~and including a filtration media; an upstream filter media support positioned upstream from~~  
and in contact with said filtration media; and a multi-layer downstream support positioned  
downstream from said filtration media, said multi-layer downstream support including a first  
downstream support layer and a second downstream support layer, wherein:

- (a) the first downstream support layer is in contact with said filtration media and is interposed between said filtration media and said second downstream layer, said first downstream support layer being fabricated so as to minimize points of surface contact with said filtration media; and
- (b) the second downstream support layer is in contact with said first downstream support layer and is fabricated so as to facilitate lateral fluid flow relative to said multi-layer downstream filter media support, wherein said second  
~~downstream support layer comprises an extruded apertured element having~~

~~ribs;~~

*the filter cartridge (10) further including:*

a perforated cage surrounding the outer periphery of the filter element;

*(20) (30)*  
a perforated core surrounded by the inner periphery of the filter element; and

*(40)*  
end caps enclosing both ends of the perforated cage.

14. A filter cartridge as recited in Claim 13, wherein said first downstream support layer is fabricated from a nonwoven material.

15. A filter cartridge as recited in Claim 14, wherein said nonwoven material is laminated to said filtration media.

16. A filter element as recited in Claim 14, wherein said nonwoven material is fabricated as a spunbond, spunlace, airlaid or wetlaid material.

17. A filter element as recited in Claim 14, wherein said nonwoven material is fabricated from polypropylene, polyester or polyamide.

18. A filter element as recited in Claim 13, wherein said second downstream

support layer is an extruded apertured element having ribs.

19. A filter element as recited in Claim 13, wherein said second downstream support layer is an extruded apertured element having ribs formed on one side.

20. A filter cartridge as recited in Claim 13 wherein the perforated cage is equipped with end caps at both ends thereof.

13. ~~21~~ A filter cartridge as recited in Claim 13 wherein said perforated core <sup>(20)</sup> is a cylindrical core and is coaxially positioned within the filter element which is a cylindrical filter element and the cage <sup>(30)</sup> is likewise cylindrical and is coaxially positioned about the cylindrical filter element.

22. A filter cartridge comprising:

a filter element having a longitudinal axis, an outer periphery and an inner periphery, and including a filtration media; and a multi-layer downstream pleat support positioned downstream from said filtration media, said multi-layer downstream support including a first downstream support layer and a second downstream support layer, wherein:

- (a) the first downstream support layer is in contact with said filtration media and is interposed between said filtration media and said second downstream layer, said first downstream support layer being fabricated so as to minimize points of surface contact with said filtration media; and
- (b) the second downstream support layer is in contact with said first downstream support layer and is fabricated so as to facilitate lateral fluid flow relative to said multi-layer downstream pleat support, wherein said second downstream support layer comprises an extruded apertured element having ribs; a perforated cage surrounding the outer periphery of the filter element; a perforated core surrounded by the inner periphery of the filter element; and end caps enclosing both ends of the perforated cage.

**This Page is Inserted by IFW Indexing and Scanning  
Operations and is not part of the Official Record**

**BEST AVAILABLE IMAGES**

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images include but are not limited to the items checked:

- ☐ **BLACK BORDERS**
- ☐ **IMAGE CUT OFF AT TOP, BOTTOM OR SIDES**
- ☐ **FADED TEXT OR DRAWING**
- ☐ **BLURRED OR ILLEGIBLE TEXT OR DRAWING**
- ☐ **SKEWED/SLANTED IMAGES**
- ☐ **COLOR OR BLACK AND WHITE PHOTOGRAPHS**
- ☐ **GRAY SCALE DOCUMENTS**
- ☐ **LINES OR MARKS ON ORIGINAL DOCUMENT**
- ☐ **REFERENCE(S) OR EXHIBIT(S) SUBMITTED ARE POOR QUALITY**
- ☐ **OTHER:** \_\_\_\_\_

**IMAGES ARE BEST AVAILABLE COPY.**

**As rescanning these documents will not correct the image problems checked, please do not report these problems to the IFW Image Problem Mailbox.**